REMARKS

Reconsideration and allowance are respectfully requested.

The Examiner indicates that the Information Disclosure Statement filed on September 19, 2005 did not apply a copy of each foreign patent document. In the Information Disclosure Statement filed September 2, 2008, copies of those foreign documents were supplied as well as other references. However, in the initial invention disclosure citation form, there were four U.S. patents cited, for which copies are not required. The Examiner's indication of consideration of these four patent documents is requested.

The claim objections are overcome in the amendments to the claims. Claims 1-18 stand rejected under 35 USC 102(e) as being anticipated by U.S. Patent Publication 2003/0223508 to Ding et al. This rejection is respectfully traversed.

Claim 1 is amended to incorporate the features of dependent claims 5 and 7, which are now canceled. Similar amendments were made to claim 10 as well as amendments to rewrite that claim without using means plus function language. New claims 19, 20, and 25 are added and find support for example at equation (3) on page 8, line 20. New claims 21-24 are method analogs to claims 1, 6, 8, and 9.

The objections noted to the claims are remedied in this amendment.

Copies of the references required by the Examiner are provided as requested.

The claims 1-18 stand rejected under 35 U.S.C. §102 as allegedly being anticipated based on Ding. This rejection is respectfully traversed.

To establish that a claim is anticipated, the Examiner must point out where each and every limitation in the claim is found in a single prior art reference. *Scripps Clinic & Research Found. v. Genentec, Inc.*, 927 F.2d 1565 (Fed. Cir. 1991). Every limitation contained in the

claims must be present in the reference, and if even one limitation is missing from the reference, then it does not anticipate the claim. *Kloster Speedsteel AB v. Crucible, Inc.*, 793 F.2d 1565 (Fed. Cir. 1986). Ding fails to satisfy this rigorous standard.

Power amplifiers are non-linear devices. This non-linearity shows up as a broadened spectrum around the desired amplified signal (and as an unwanted inband component of the signal), as illustrated in Fig. 2. As a counter-measure to decrease the effects of non-linearity, it is known to pre-distort the signal at the input of the amplifier to give an un-distorted amplified signal at the output of the amplifier. This technique is called pre-distortion and is illustrated in Fig. 3. The input-output signal characteristic for a pre-distorted power amplifier is essentially linear up to saturation, as illustrated in Fig. 4.

Memory effects is another problem related to power amplifiers. Memory effects typically show up as a non-symmetrical spectrum around the carrier at the output of a power amplifier, as illustrated in Fig. 5.. That is, although the carrier (desired signal) spectrum is perfectly symmetrical, the spurious spectrum coming from the distortion may be non-symmetrical with respect to the center of the carrier. There is a theoretical way of designing a pre-distorter that takes care of all memory effects. This is called the Volterra series. Ding in reference [3] identified in the specification describes an approximation of the Volterra series where the desired pre-distortion PD(n) may be expressed as:

$$PD(n) = \sum_{k=1}^{K} \sum_{q=0}^{Q} a_{kq} x(n-q) \left| x(n-q) \right|^{k-1}$$

where $x(n-q)$ denotes the delayed (by q time units) input samples and a_{kq} is a constant that denotes the expansion coefficients.

The inventor recognized that this equation was still too complicated and could be simplified as explained in the specification on pages 5 and 6 where the polynomials $T_q(|x(n-q)|)$ are identified to obtain:

$$PD(n) = \sum_{q=0}^{Q} x(n-q) T_q(|x(n-q)|)$$

The coefficients a_{kq} may be obtained as a least squares solution to an over-determined system of equations as described in [3].

But the inventor also recognized a further problem associated with power amplifiers is that rapidly (but slow in comparison to instantaneous signal variations) changing power levels on the input signal will give rise to changes in power amplifier parameters. Internal heating of semi-conductor components indirectly causes this. He solved this problem by developing a way to predict these changes quickly and then make appropriate adjustments.

Rather than assuming that the coefficients a_{kq} in the polynomials:

$$T_q(|x(n-q)|) = \sum_{k=1}^{K} a_{kq} \cdot |x(n-q)|^{k-1}$$

are constants, the flexible approach recited in the independent claims lets the coefficients depend on a varying parameter "z" representing at least transistor temperature. That parameter may also represent average input power level and/or transistor bias. The original polynomials $T_q(|x(n-q)|)$ may be expressed as a series of polynomials $T_{qm}(|x(n-q)|)$ multiplying different powers of z. The pre-distortion may be approximated as:

$$PD(n,z) = \sum_{q=0}^{Q} x(n-q) \left[\sum_{m=0}^{M-1} T_{qm}(|x(n-q)|) z^m \right]$$

Such pre-distorter (PD) may be implemented by a set of look-up tables in each delay branch, as illustrated in Fig. 8 where the expressions in the brackets "[ ]" may be viewed as "filter coefficients."

Although Ding describes a pre-distorter based on an approximation of the Volterra response (see [0043]) that can be implemented using coefficient lookup tables, Ding fails to disclose or suggest: "means for compensating for changes in at least one predetermined parameter, wherein said parameter represents amplifier temperature," as recited in claim 1. The Examiner identified Figure 6 and [0041] in the office action for claims 5 and 7. But neither reference teaches compensating for changes in amplifier temperature in addition to changes in input signal amplitude. Ding simply generates a predistorted signal based on input signal amplitude. Paragraph [0041] of Ding only describes what is taught in first year electronics courses, i.e., that junction temperature can contribute to memory effects in amplifiers. But Ding does not teach compensating for temperature changes in Ding's predistortion equations.

Regarding claims 6 and 15, Ding does not disclose anything about "average predistorter input signal power" in [0041] or [0053]. It is not seen where Ding even refers to averaging.

For claims 8 and 17, the Examiner seems to misunderstand what is being claimed. They do not claim simply that the power amplifier transistor has a bias. Rather, these claims recite that the compensation includes a <u>compensation</u> for temperature and bias.

The formula recited in new claims 19, 20, and 25 is not found in Ding.

The provisional double patenting rejection is noted but since it is provisional, it is premature to comment on it.

The application is in condition for allowance. An early notice to that effect is requested.

Respectfully submitted,

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The Examiner is requested to initial the attached form PTO/SB/08a and to return a copy of the initialed document to the undersigned as an indication that the attached references have been considered and made of record.

Pursuant to Rule 37 C.F.R. §1.97(c), a fee of $180.00 as specified in Rule 17(p) is attached. If there is any shortage in the fee, please charge the deposit account of Nixon & Vanderhye, Account No. 14-1140.

Respectfully submitted,

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